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Long-term sustainability of outer space activities (basic elements of the concept of establishing a unified Centre for Information on Near-Earth Space Monitoring under the auspices of the United Nations and the most topical aspects of the subject matter)

Working paper by the Russian Federation*

1. The new phase in the work of the Scientific and Technical Subcommittee (STSC) on the draft guidelines for ensuring the long-term sustainability of outer space activities entails consolidating the preliminary results of efforts undertaken and developing a common understanding regarding future actions. Undoubtedly positive is the fact that, despite all known objective constraints and factors complicating the process, it has been possible, in the main, to lay the foundations for a broad and high-quality presentation and analysis of issues that need to be successfully resolved for the sustainable development of space activities in the long term. The main thing has been achieved, i.e. we have considered the subject in depth. It is increasingly evident that the international community is capable of synthesizing and articulating fundamentally new ideas that will have a significant positive impact on the development of the models of behaviour of participants in space activities. It is important that the dialogue — notwithstanding the remaining differences of approach — is kept positive with the accent on thorough study of the practical aspects of the issues under consideration. While abiding by its constructive positions, the STSC must provide substantive answers to a rather wide range of important issues — both those that have already been discussed and those that have

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not yet been adequately identified. Accordingly, the text of the draft guidelines on a number of provisions dealing primarily with the safety aspects of space operations will have to be assessed in terms of categories pertaining to domains of more advanced political logic. In a sense, it is precisely in relation to safety that the debate has reached a critical stage where a series of well-adjusted and competent decisions need to be taken to create the conditions for developing a genuine model of cooperation. The preliminary outline of the guidelines relating to the issues of space debris, space operations and tools to support collaborative space situational awareness does not promise a policy breakthrough, because it fails to provide a model for resolving a number of important issues. The material produced so far, while positive in the overall impression it makes, is not yet sufficiently indicative in terms of providing an understanding of prospects and mechanisms for cooperation in this area.

2. In this context there is a need to fully develop the idea of a unified Centre for information on near-Earth space monitoring that has appeared in the working paper of the Russian Federation entitled "Prerequisites for promoting consideration of ways and means of maintaining outer space for peaceful purposes in the context of the issue of the long-term sustainability of outer space activities" (A/AC.105/C.1/L.338). It may be assumed with sufficient confidence that the creation of such an entity would allow efforts to be concerted within the framework of a consolidated, predictable and successful system of space information exchange. In all respects, this would be the best solution. With a view to more detailed discussion of this idea, the basic elements of the concept of establishing such a centre are proposed for consideration.

Basic elements of the concept of establishing a unified Centre for information on near-Earth space monitoring under the auspices of the United Nations (henceforth referred to as "the Centre")

I. Rationale

- The need to create a universal tool for information exchange among interested States and international organizations with a view to ensuring the long-term sustainability and safety of space activities, the collection and dissemination of information on objects and events in near-Earth space, the accumulation of the greatest possible volume of reliable information and the provision of assured access to such information on a non-discriminatory basis.

II. Purposes and tasks

- Organization and maintenance of an international bank of continually updated and archived multi-source data relating to objects and events in near-Earth space (hereinafter referred to as "the data bank");
- Provision to interested users, approved by States and international organizations, of authorized access to the data bank to upload their data and use the information stored in the data bank, on the basis of unified methodological approaches;

- Introduction into the practice of international information exchange of agreed uniform templates to define the structure and content of information on objects and events in near-Earth space;
- Establishment of an international mechanism for the immediate (non-delayed) dissemination of critical information concerning dangerous situations in outer space.

III. Issues that could be addressed within the framework of the United Nations Committee on the Peaceful Uses of Outer Space (including its Scientific and Technical Subcommittee) and through the channels of the United Nations Office for Outer Space Affairs, in the context of the initial implementation phase of the initiative

- Coordination of the nomenclature applied to information which it would be expedient to store in the data bank;
- Definition of requirements for hardware and system-wide software, taking into account the requirement for data bank backup, continuous multi-user access to the data bank and information security;
- Definition of requirements for the special software;
- Definition of requirements for the rules governing information exchange between users and the data bank in data receipt and transmission modes.

IV. Indicative list of information for the data bank

- Information on launches of space objects (pursuant to obligations under the 1975 Convention on Registration of Objects Launched into Outer Space, and considering the recommendations contained in United Nations General Assembly resolution 62/101, as well as the guidelines for the long-term sustainability of outer space activities being developed and planned for adoption);
- Information on predicted (planned) and actual re-entries of objects from near-Earth orbit (controlled and uncontrolled);
- Information on predicted conjunctions of objects in near-Earth space;
- Information on the break-up and collision of objects in near-Earth space;
- Information on objects in near-Earth space detected by space monitoring means;
- Information on in-orbit operations;
- Information on failures of on-board equipment or unknown effects exerted on space objects.

V. Data transfer mode

Taking into account the time scale of events in space and the technical capabilities of the current systems used to monitor these events, the information will inevitably be provided with a certain time delay. The time interval between the actual event in space and the appearance of information on it can vary quite widely

depending on the type of orbit in which the event occurred, the nature of the event, the characteristics of objects formed as a result of the event (if such have actually formed) and the technical capabilities of the monitoring means.

Orbital information on objects in near-Earth space and assessments of its accuracy would be transmitted to the Centre in a unified way (ephemerides presented in a single coordinate system and referred to a single time scale) independently of initial motion models, the content of measurement information used to derive the orbital information and the methods used for predicting orbital motion.

Certain restrictions with regard to volume, frequency of updates and actual accuracy of information owing to a range of practical factors are presumed. First of all, for objective reasons it will be necessary to take into account national security considerations.

The provision of information should not, under any circumstances, be subject to unfair practices involving the transfer of information known to be false and/or misleading information. The information voluntarily provided to the data bank should be confined to information deemed by the owners themselves to be credible and reliable according to their own requirements and criteria.

Equally, it is presumed that decisions on the expediency of using information and the extent to which it is used for taking action to prevent threats to the safety of space operations or to respond to such threats (including the development at national level of relevant regulations and requirements and the performance of functions and procedures to ensure the safety of space operations) will be the prerogative of the data bank users. There should be a legal presumption that the information provided may not serve as grounds to hold the supplier liable in cases where the user incurs damage as a result of action or omission to act based on the content of such information. There should be a presumption that, in any model for the establishment and operation of the Centre, provision should be made for the United Nations to operate within the framework of a general system of mutual waiver of liability.

VI. Preliminary ideas on the architecture of the Centre

The data bank and related software will be hosted on two servers: a main server ("information store") and a support server (for user applications). Each server should have a backup server to which all information is copied. The servers would be connected to the computer information network which the operator of the Centre has at its disposal. The operating safety of the servers should be assured and server access provided for under the general security policy applicable to the information network to which the servers are connected. User applications should be based on modern web technologies using secure data transfer protocols. Provision should be made for different levels of access to information resources (in particular, the data administrator level, security administrator level and various categories of user levels). The staff members responsible for the existing computer information network should run the Centre's operation on a permanent basis. This architecture could be established on the basis of the resources available at the United Nations Office in Vienna.

3. At the present time there is no national monitoring system with comprehensive coverage of all areas of near-Earth space, which adds weight to the case for fully developing the concept of mutually complementary capabilities within the Centre. The initiative to establish the Centre is motivated by the desire to safeguard the interests of the international community in obtaining information that may be needed for the analysis and interpretation of events, taking into account the various factors that affect a wide range of evolving conditions in the space environment. Implementation of this project, characterized as it is by technical rationality and functionality, would not only break new ground in assuring the safety of space operations but would also provide a range of incentives to substantially reinforce positive unifying trends in the development of a dialogue on confidence-building measures in space activities. The dialectical relationship between these issues is clearly being enhanced. Acting in reliance on the logic of partnership, States could gain unique experience in terms of value and substance, contributing to the revitalization of international policymaking and directly improving the prospects for maintaining outer space for peaceful purposes. Given that the proposed Centre is envisaged as being directly associated with the United Nations, States and international organizations should, in their roles as suppliers and recipients of information, maintain the collectively established system at a level of heightened responsibility, organizing the activities of the Centre in accordance with principles, norms and values set out in the 1967 Outer Space Treaty. Doing so will ensure that the information supplied, including exclusive information, is positioned in a qualitatively new fashion in the context of an open, fair and predictable policy.

4. The set of guidelines being developed, as they relate to safety and security, should be given a more logical structure through the development of additional normative material on a number of topical aspects of the subject matter that cannot be neglected. In particular, future guidelines should be closely linked to the issue of security of the ground segments of the space infrastructure of States, which directly affects the safety of space operations. Equally, future guidelines should call for rationally organized interaction in the sphere of international information (cyber) security. Regulation in these two specific domains could become the basis for a positive vision of solutions to issues which are highly important and a new culture of partnership in the interests of security, based on the merging of security interests and ethical considerations. The format of the future guidelines does not imply exhaustive legal regulation of these issues. What is proposed is, rather, an intermediate model of more constructive conduct on the part of States and other participants in outer space activities, whereby urgent needs will be responded to and learned from more actively, gaining a public airing and expression in the context of updated policy approaches. It is also important to agree in principle on the political and legal approaches to the conduct of operations on active removal of space debris, functioning spacecraft and/or non-functioning spacecraft so that any future practices for cleaning outer space should be organized on legal foundations right from the start. Attention to all these important and pressing issues should lend greater depth and breadth to the concept and practice of long-term sustainability of outer space activities. This approach entails greater complexity in terms of harmonizing the positions of States but is valid and justifiable in that it takes account of the objective challenges of the present time.

5. In addition to the proposals contained in the above-mentioned working paper of the Russian Federation, the following draft potential guidelines are submitted for

the attention of the STSC (wordings have been drafted in two original versions in the Russian and English languages):

Build an international information and data-sharing system

States and international organizations should be encouraged to set up and maintain trusted and appropriately defined procedures for sharing information to support their common and individual interests related to evolving, anticipated and potential dangerous situations in near-Earth space which may affect the safety and security of outer space operations. In order to properly administer the enforcement of such procedures, States and international organizations shall officially designate, and make publicly available contact information for, appropriate entity with functional capability to engage in information exchanges, process incoming incident reports and forecasts, and serve as contact points with regard to adopting precautionary and response measures, thus supporting crisis warning and management mechanisms.

States and international organizations should be encouraged to develop, implement and use an agreed international mechanism for exchanging actual data on all functioning and non-functioning objects in near-Earth space (considering possibilities of emergence of dangerous situations in space environment) that would be open for participation of all interested parties and shaped so as to promote, in all practical aspects, the timely provision (considering the need for pre-emptive actions) of reliable, sufficiently complete and accurate information (including information conclusively presumed as such by the transferring party), referred to specific instant or time interval, and supported by information on relevance interval of the transmitted data. [A unified Centre for information on near-Earth space monitoring is to be established and operated under the auspices of the United Nations Organization to serve as a core element of a distributed international information system and an information platform for multilateral cooperation in sharing and disseminating multi-source information on objects and events in near-Earth space. The organizational arrangement and statutory tasks and responsibilities of the Centre shall be elaborated through the United Nations Committee on the Peaceful Uses of Outer Space and endorsed by the United Nations General Assembly.]

Observe criteria for operations on active removal of orbital objects

States and international organizations considering or initiating execution of, or involvement in, operations for active removal of space debris, functioning space objects and/or non-functioning space objects, should, in the process of making their judgments with regard to feasibility and safety of such operations and throughout their preparation and execution stages, thoroughly review and effectively implement a coherent set of stringent requirements and measures aimed at ensuring identification, analysis, evaluation and prevention of risks, as well as employing appropriate means and methods that would make such operations safe and fully consistent with the principles and norms of international law. Decisions on risk mitigation methods and the choice of tools and techniques to implement active removal operations should reckon with the overriding task associated with the preclusion of any actions or

omissions that could create vulnerability of, a threat to, and/or result in the loss of other State, other international organization or foreign entity owned or operated orbital systems, complexes and means, including operational malfunction, degradation, or loss of integrity thereof, in part or whole, and, thus, impair or circumscribe rights and interests of the said States, international organizations or foreign entities. It should be commonly understood that any active removal operations:

- Rule out coercive technological impacts on the above space assets in the absence of appropriately authenticated concurrence of, and authority explicitly conferred by, the State (including the State of registry), international organization and/or entity concerned;
- May not lead to any jurisdiction and/or control functions irregularities with regard to such foreign assets.

Respect the security of foreign space-related ground and information infrastructures

Note: the wordings submitted by the Russian Federation in June 2013 that constitute the first paragraph are supplemented by the second paragraph on international information (cyber) security, to form a single draft guideline.

States and international organizations should be encouraged to consider the concept of and practices for ensuring the long-term sustainability of outer space activities as forming an integral whole with the issues of safety and security of ground infrastructure that provides the proper operation of, and receiving and processing of data from, orbital systems, complexes and means. Following the line of responsible and peaceful conduct of space activities, States and international organizations should, as part of providing overall institutional support for the concept of and practices for ensuring the long-term sustainability of outer space activities, adopt decisions that are reasoned and effectively formalized at policy and doctrine levels so as to exclude any actions that could impair or adversely affect the serviceability of such ground infrastructure under foreign jurisdiction and/or control.

Such comprehensive approach requires collective acceptance of responsibilities by States and international organizations to establish and pursue, within the framework of their information (cyber) security doctrines and strategies and through active efforts at the international level, an information security policy that would appropriately address the need for, and modalities of, effective cooperation in preventing, identifying, investigating and deterring malicious usage of information and communications technologies and/or any other activities incompatible with the task of mitigating vulnerabilities of, and precluding disruptions to, critical national, foreign and international information infrastructures, that may be directly associated with ensuring safe and secure operation of orbital systems, complexes and means under national or foreign jurisdiction. Consequently, States and international organizations should, whenever needed and/or as requested, establish liaisons and engage in practical interaction with each other in response to relevant real-time, emerging and potential threats and incidents in the segment under consideration.